



A Landscape Assessment of the Catskill/Delaware Watersheds 1975-1998

New York City's Water Supply Watersheds

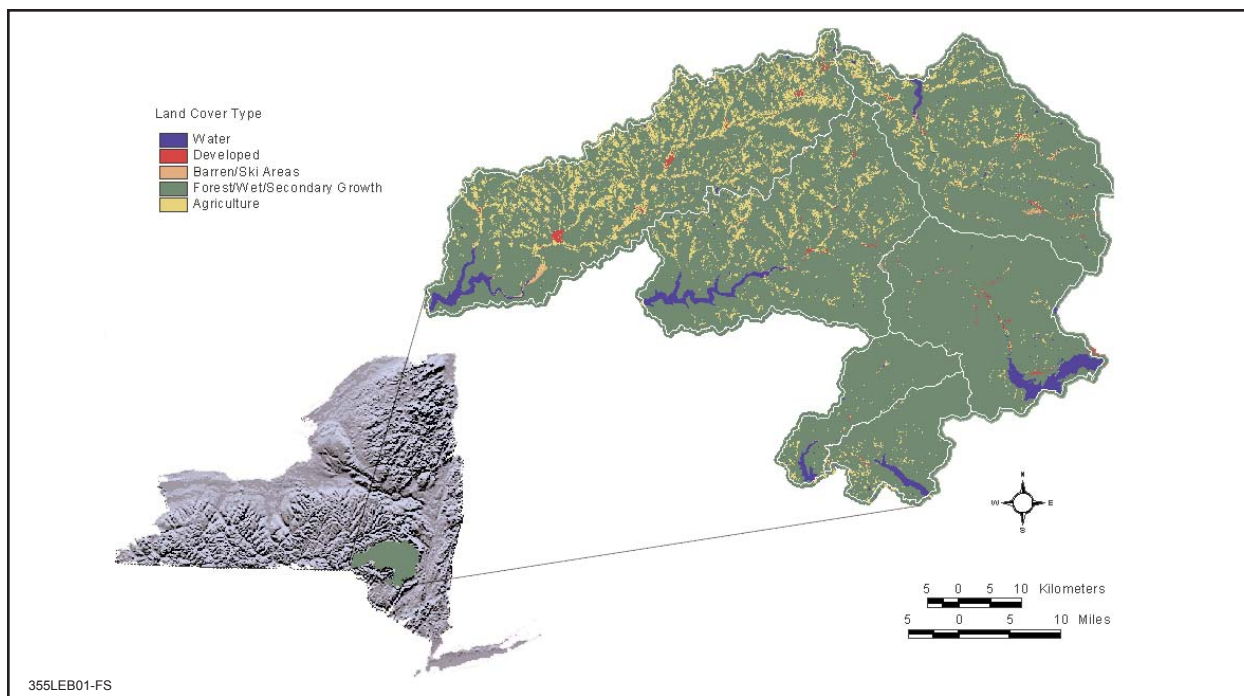
The U.S. Environmental Protection Agency's (EPA) Office of Research and Development (ORD), National Exposure Research Laboratory's (NERL) Landscape Ecology Branch has published the report, "A Landscape Assessment of the Catskill/Delaware Watersheds (1975-1998) - New York City's Water Supply Watersheds."

This report represents a large-scale environmental assessment of potential risks to water resources from multiple landscape stressors in the Catskill/Delaware water supply watersheds. The streams of the Catskill/Delaware watersheds flow into a set of reservoirs which supply drinking water to New York City. Two decades of landscape and water quality data collected from within the watersheds were examined for trends over time and for meaningful relationships between land use and surface water conditions.

Background

The 1980s witnessed increased interest in protecting whole ecosystems from chronic environmental problems. However, the resulting regulations and standards were often separated in relation to specific materials or media such as water, air, or soil. Current thinking is evolving toward examination of critical environmental problems over larger spatial scales and assessment of cumulative risk resulting from multiple stresses or stressors. In response to this need, a landscape-scale research program was initiated by the EPA in 1992. The landscape-scale assessment approach was applied to a set of community-based watersheds in southeastern New York State. The streams of the Catskill/Delaware watersheds flow into six reservoirs which supply 90% of New York City's drinking water. The water supplied from these reservoirs has, to date, required only minor treatment to be suitable for drinking.

Location and Land Cover of the Catskill/Delaware Watersheds in New York State



A Landscape Assessment of the Catskill/Delaware Watersheds 1975-1998

Background (continued)

To continue supplying high quality drinking water and to avoid the need for a multibillion dollar water filtration system, New York City implemented a long-term land management strategy. Upgrades to sewage treatment plants and purchase of more lands are key components to pollutant reduction and continued non-filtration. The purpose of this study was to provide information that may assist in the protection of the Catskill/Delaware water supply to managers, policy makers, and the general public.

The Assessment

Elevation data and satellite images were used to assess the landscape of the Catskill/Delaware watersheds. The elevation of the area is diverse and includes some of the highest mountains in the State. The landscape has changed little in the past two decades, forest cover remains the dominant vegetation in the area. Compared to other watersheds within Region 2, States of New York and New Jersey, the environmental disturbance within the Catskill/Delaware watersheds is low. Population has only increased by about 15% (between 1970 and 1995), from 53 to 64 thousand people. However, as a result of topographic constraints, the majority (90%) of urban development and agricultural land use is located near streams.

A wide variety of landscape measurements were evaluated in this study. Those most related to water quality were percentage agriculture, urban, bare ground, agriculture on erodible soils, agriculture on steep slopes and stream density. The relationship between land use and surface water pollutant levels were statistically analyzed. This analysis indicated that the amount and location of human use in the landscape has direct consequences to surface water condition. For example, release of agricultural fields from farming during the past two decades has returned a small percentage of land to secondary growth forest, resulting in a 2% net increase in forest cover. The effect of this land cover change was a decrease in nutrient contribution to the water.

The results of this study suggest that targeting "at risk" watersheds for enrollment in land use management programs may have a greater overall impact on pollution reduction than random areawide enrollment programs. Balancing water quality protection and economic growth requires a great deal of thought, coordination, and cooperation. As demonstrated by this study, human use of the landscape has direct consequences on water quality resources. Even changes as small as 2% may be of importance. Whether or not the change is beneficial to the water supply rests on the choices made by those living in the area. Economic and social incentives encouraging forestry, agriculture and urban planning and management geared for specific pollutant problems can all help facilitate the continued success of New York City's long-term watershed management plans for the Catskill/Delaware water supply watersheds.

Products of this Study

- A land cover database with imagery from the mid 1970s, mid 1980s, early 1990s, and late 1990s.
- A set of landscape measures (metrics) for each image date compiled into an easy to use format within a Geographical Information System.
- A set of supplemental geographic data on elevation, watershed boundaries, surface geology, aqueducts and tunnels, stream drainage, city and state owned lands, sewage treatment plants, roads, and population data.
- Landscape models for surface water total nitrogen, total phosphorus and fecal coliform bacteria.
- EPA reports, fact sheets and journal publications summarizing the study and its findings.

An electronic version of the report is available at (<http://www.epa.gov/nerlesd1/land-sci/ny.htm>).

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